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(12) **EUROPEAN PATENT APPLICATION**

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(71) Applicant: UNILEVER NV
Burgemeester s'Jacobplein 1 P.O. Box 760
NL-3000 DK Rotterdam(NL)
CH DE ES FR IT LI NL SE
Applicant: UNILEVER PLC
Unilever House Blackfriars P.O. Box 68
London EC4P 4BQ(GB)
GB

(72) Inventor: Fry, Alan John
35 Winchester Avenue
Ellesmere Port South Wirral L65 5DL(GB)

(74) Representative: Van Gent, Jan Paulus et al
Unilever N.V. Patent Division P.O. Box 137
NL-3130 AC Vlaardingen(NL)

(54) Enzymatic liquid detergent composition.

(57) The invention relates to an aqueous, enzymatic liquid detergent with improved enzyme stability. By inclusion of a specific type of preservative of the isothiazolinone type, the rate of enzyme deactivation is significantly retarded.

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ENZYMATIC LIQUID DETERGENT COMPOSITION

The present invention relates to an aqueous enzymatic liquid detergent composition with improved storage stability of the enzymes contained therein.

It is well known in the art that enzymes can lose their activity over a certain period when included in an aqueous liquid detergent composition, and various proposals have already been made to retard that loss of activity by including in such compositions an enzyme-stabilizing system.

We have now surprisingly found that the inclusion of a certain class of preservatives in such aqueous enzymatic liquid detergent compositions also retards the loss of enzyme activity.

Since preservatives are compounds which either kill or inhibit the growth of microorganisms, one would expect such preservatives either to be indifferent to the enzymes or to affect them negatively, depending upon their chemical constitution. In contrast thereto, we found quite unexpectedly that a certain class of preservatives has a positive influence on the enzyme activity in that they significantly retard the rate of enzyme deactivation.

This specific class of preservatives embraces the compounds having an isothiazolinone backbone in their molecule. Typical examples of such compounds are 1,2-benzisothiazolin-3-one, 5-chloro-2-methyl-4-isothiazolin-3-one, 2-methyl-4-isothiazolin-3-one.

We have found that the inclusion of a small amount of these preservatives, in the range of 0.001-0.1% by weight of the total detergent composition, significantly retarded the enzyme deactivation.

The present invention therefore relates to an aqueous enzymatic liquid detergent composition with an improved storage stability of the enzymes contained therein, the improved storage stability being obtained by the inclusion in the composition of 0.001-0.1% of a preservative having an isothiazolinone backbone in its molecular structure.

The enzymatic liquid detergent composition of the present invention contains as essential ingredients a detergent-active component and enzymes.

The detergent-active component can be either soap, anionic, nonionic, cationic or zwitterionic synthetic detergents and mixtures of one or more of these detergent-active components.

Preferably a nonionic synthetic detergent is used, either as such or in admixture with a cationic detergent-active component.

Usually, the total amount of detergent-active component(s) ranges from 5-70, preferably from 10-40% by weight of the total composition.

The enzymes that can be used in the present invention are proteases, amylases, lipases, cellulases and mixtures of one or more of these enzymes. Proteases are preferred enzymes for use in the present invention. The amount of enzymes present in the composition may range from 0.001-10% by weight.

The composition may furthermore contain other optional ingredients such as perfumes, colouring materials, soil-suspending agents, other enzyme-stabilising agents, builders, bleaching agents, bleach precursors, hydrotropes, solvents, suspending agents suds suppressors etc.

The invention will be further illustrated by way of Example.

EXAMPLE

The following formulation was prepared:

	% by weight
C_{13}-C_{15} primary linear alcohol, condensed with 7 moles of ethylene oxide	15.0
di(soft tallow) dimethylammonium chloride	1.5
industrial methylated spirit	5
propylene glycol	5
borax decahydrate	1.5
perfume	0.25
colour	0.001
protease (Alcalase R ex Novo)	0.34*
preservative	x
demineralised water	to 100%.

* Corresponds to a proteolytic activity of 6 glycine units per milligramme.

1,2-Benzisothiazolin-3-one was included as preservative, at various concentrations and the residual enzyme activity determined after storage at 37°C for four weeks. For comparison purposes; the formulation without any preservative as well as with 0.075% formaldehyde were also included in the tests.

The following results were obtained:

Enzyme activity (in GU/mg)

Formulation	Initial	After 4 weeks at 37°C
Control (no preservative)	5.9	2.5 (42% remaining)
+ 0.003% 1,2-benzisothiazolin-3-one	5.9	2.8 (47% remaining)
+ 0.0165% 1,2-benzisothiazolin-3-one	5.7	3.5 (61% remaining)
+ 0.03% 1,2-benzisothiazolin-3-one	5.8	4.3 (74% remaining)
+ 0.075% formaldehyde	5.4	1.7 (31% remaining)

Claims

1. An enzymatic liquid detergent composition comprising 5-70 % by weight of a detergent-active material, from 0.001-10 % by weight of an enzyme which is a protease, amylase, lipase or cellulase, the balance being an aqueous medium, characterised in that it contains from 0.001-0.1 % by weight of a preservative having an isothiazolinone backbone in its molecular structure.

2. A composition according to claim 1, characterised in that the preservative is 1,2-benziso-thiazolin-3-one, 5-chloro-2-methyl-4-isothiazolin-3-one or 2-methyl-4-isothiazolin-3-one.

3. A composition according to claim 1 or 2, characterises in that the preservative is 1,2-benzisothiazolin-30-one.

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(71) Applicant: UNILEVER NV
Burgemeester s'Jacobplein 1 P.O. Box 760
NL-3000 DK Rotterdam(NL)

(84) CH DE ES FR IT LI NL SE

(71) Applicant: UNILEVER PLC
Unilever House Blackfriars P.O. Box 68
London EC4P 4BQ(GB)

(84) GB

(72) Inventor: Fry, Alan John
35 Winchester Avenue
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EUROPEAN SEARCH REPORT

Application Number

EP 86 20 2180

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-2 758 022 (HENKEL) * Claim 1; page 2, lines 22-28 *	1	C 11 D 3/386
A	FR-A-2 099 701 (HENKEL) * Claim 1; page 11, lines 13-30 *	1	
A	CHEMICAL ABSTRACTS, vol. 96, no. 12, 22nd March 1982, page 112, abstract no. 87465j, Columbus, Ohio, US; & JP-A-81 149 498 (LION CORP.) 19-11-1981 * Abstract *	1	
A	US-A-4 105 431 (S.N. LEWIS) * Examples L,E; claims 1,4 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

C 11 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	07-06-1988	PFANNENSTEIN H.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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(12) # EUROPEAN PATENT SPECIFICATION

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(56) References cited:
DE-A- 2 758 022
FR-A- 2 099 701
US-A- 4 105 431

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(72) Inventor: Fry, Alan John
35 Winchester Avenue
Ellesmere Port South Wirral L65 5DL(GB)

(74) Representative: Stancliffe, Terence Christopher et al
UNILEVER PLC Patents Division P.O. Box 68
Unilever House
London EC4P 4BQ(GB)

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Description

The present invention relates to an aqueous enzymatic liquid detergent composition with improved storage stability of the enzyme contained therein.

It is well known in the art that enzymes can lose their activity over a certain period when included in an aqueous liquid detergent composition, and various proposals have already been made to retard that loss of activity by including in such compositions an enzyme-stabilising system.

The prior art as to industrial enzyme preparations includes the use of various biocides. Thus DE-A-27 58 022 relates to catalase preparations containing 0.05-0.5% by weight of a microbicide. FR-A-2 099 701 relates to liquid enzyme preparations stabilised with various stabiliser materials, and also expediently including various antimicrobial substances to protect the enzymes from the harmful influence of microorganisms. 3-Isothiazolones and their use as biocides or disinfectants in applications including oil, leather, paper, and soap are known from US 4 252 694.

We have now surprisingly found that preservatives having an isothiazolinone backbone in their molecule, when included at from 0.001-0.1% by weight in aqueous enzymatic liquid detergent compositions comprising 5-70% by weight of detergent-active material and from 0.001-10% by weight of protease, amylase, lipase or cellulase enzyme (the balance being aqueous medium), also retard the loss of enzyme activity.

Typical examples of suitable such compounds are 1,2-benzisothiazolin-3-one, 5-chloro-2-methyl-4-isothiazolin-3-one, and 2-methyl-4-isothiazolin-3-one.

We have found that the inclusion of a small amount of these preservatives, in the range of 0.001-0.1% by weight of the total detergent composition, significantly retarded the enzyme deactivation.

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Usually, the total amount of detergent-active component(s) ranges from 5-70, preferably from 10-40% by weight of the total composition.

The enzymes that can be used in the present invention are proteases, amylases, lipases, cellulases and mixtures of one or more of these enzymes. Proteases are preferred enzymes for use in the present invention. The amount of enzymes present in the composition may range from 0.001-10% by weight.

The composition may furthermore contain other optional ingredients such as perfumes, colouring materials, soil-suspending agents, other enzyme-stabilising agents, builders, bleaching agents, bleach precursors, hydrotropes, solvents, suspending agents suds suppressors etc.

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demineralised water	to 100%.

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2. A composition according to claim 1, characterised in that the preservative is 1,2-benziso-thiazolin-3-one, 5-chloro-2-methyl-4-isothiazolin-3-one or 2-methyl-4-isothiazolin-3-one.

3. A composition according to claim 1 or 2, characterised in that the preservative is 1,2-benzisothiazolin-3-one.

Revendications

1. Composition détergente liquide enzymatique comprenant de 5 à 70% en poids d'un détergent actif, de 0,001 à 10% en poids d'une enzyme qui est une protéase, une amylase, une l i pase ou une cellulase, le complément étant un milieu aqueux, caractérisée en ce qu'elle contient de 0,001 à 0,1% en poids d'un conservateur comportant un édifice de base d' isothiazolinone dans sa structure moléculaire.

2. Composition selon la revendication 1, caractérisée en ce que le conservateur est la 1,2-benzisothiazolinone-3, la 5-chloro-2-méthyl-4-isothiazolinone-3 ou la 2-méthyl-4-isothiazolinone-3.

3. Composition selon la revendication 1 ou 2, caractérisée en ce que l e conservateur est la 1, 2-benzisothiazolinone-3.

Ansprüche

1. Enzymatische, flüssige Detergenszusammensetzung umfassend 5-70 Gew.-% eines Detergens-aktiven Materials, 0,001-10 Gew.-% eines Enzyms, das eine Protease, Amylase, Lipase oder Zellulase ist, wobei der Ausgleich ein wäßriges Medium ist, dadurch gekennzeichnet, daß sie 0,001-0,1 Gew.-% eines Konservierungsmittels mit einem Isothiazolinon-Gerüst in ihrer Molekularstruktur enthält.

2. Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß das Konservierungsmittel 1,2-Benzisothiazolin-3-on, 5-Chlor2-methyl-4-isothiazolin-3-on oder 2-Methyl-4-isothiazolin-3-on ist.

3. Zusammensetzung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Konservierungsmittel 1,2-benzisothiazolin-3-on ist.